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ABSTRACT

The monograph provides an integrative review on the environmental and instructional factors that appear to be most conducive to the complex, interactive, and interdependent process of learning. Ten instructional strategies empirically documented to have a critical impact on a student's ability to learn are discussed in detail. They are: (1) The degree to which classroom management is effective and efficient; (2) The degree to which there is a sense of "positiveness" in the school environment. (3) The degree to which there is an appropriate instructional match; (4) The degree to which teaching goals and teacher expectations of student performance and success are stated clearly and are understood by the student; (5) The degree to which lessons are presented clearly and follow specific instructional procedures; (6) The degree to which instructional support is provided for the individual student; (7) The degree to which sufficient time is allocated for academics and instructional time is used efficiently; (8) The degree to which the student's opportunity to respond is high; (9) The degree to which the teacher actively monitors student progress and understanding; and (10) The degree to which student performance is evaluated appropriately and frequently. (DB)

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University of Minnesota

MONOGRAPH NO. 7

INSTRUCTIONAL FACTORS THAT INFLUENCE STUDENT ACHIEVEMMENT: AN INTEGRATIVE REVIEW

James E. Ysseldyke, Sandra L. Christenson
and Martha L. Thurlow

INSTRUCTIONAL ALTERNATIVES PROJECT

September, 1987

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INSTRUCTIONAL FACTORS THAT INFLUENCE STUDENT ACHIEVEMENT: AN INTEGRATIVE REVIEW

James E. Ysseldyke, Sandra L. Christenson, and Martha L. Thurlow

Instructional Alternatives Project

University of Minnesota

September, 1987

Abstract

This monograph is an integrative review from seven areas of study, that defines and discusses the environmental and instructional factors that appear to be most conducive to the highly complex, interactive, and interdependent process of learning. Ten instructional strategies empirically documented to have a critical impact on a student's ability to learn are discussed in detail. They include such factors as degree of academic engaged time, monitoring, feedback, and establishing an appropriate match between student ability and assigned task. Implications for instructing handicapped students are discussed, with an emphasis on the need to place the instructional focus on the individual within the group, rather than on the group as a whole.

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Instructional Factors That Influence Student Achievement: An Integrative Review

This monograph is an integration of five monographs, derived from seven areas, that address implications for the instruction of handicapped students: instructional psychology and models of school learning (Christenson, Ysseldyke, and Thurlow, 1987), school effectiveness (Thurlow, Christenson, & Ysseldyke, 1987), instructional effectiveness (Christenson, Thurlow, & Ysseldyke, 1987), teacher effectiveness and teacher decision making (Ysseldyke, Thurlow, & Christenson, 1987), and student cognitions (Thurlow, Ysseldyke, & Christenson, 1987). It is our purpose in this monograph to describe those instructional factors that are documented, empirically, to be important for learning.

Achievement is the product of learning -- not learning itself (Howell, 1986). The amount of learning a student is able to accomplish is a result of many interacting and mutually influencing factors, specifically: student, teacher, classroom, instructional, school district, and home characteristics. In a quantitative synthesis of some 3,000 studies that analyzed causal influences on students' affective, behavioral, and cognitive outcomes, Walberg (1984) found that there were three major causal influences on student learning: aptitude (ability, development, and motivation), instruction (degree of student engagement and the overall quality of the instructional experience), and environment (home, peer, classroom climate, and television).

Many of these factors are influenced by more than teacher efforts. Ability and motivation, for example, are influenced by parents, by prior learning, and by students themselves (Walberg, 1984). While environment and aptitude exert a strong causal influence on learning outcomes, the results of Walberg's research also demonstrate the powerful influences of time and instructional quality on learning. Walberg (1985) has concluded that classroom learning is a:

> multiplicative, diminishing-returns function of four essential factors (student ability and motivation, and quality and quantity of instruction) and possibly four, supplementary or supportive factors (the morale or social-psychological environment of the classroom, education-stimulating conditions in the home and in the peer group, and exposure to mass media, particulary television).....Within this theoretical perspective,..educators seek to modify the amount and quality of instruction to make it more suitable to the ability and motivation of each student to: (a) raise the average class achievement, (b) bring each student to at least a, (c) diminish the variability of outcomes, or (d) optimize a combination of these three goals. (p. 7)

While instructional factors may be, to a greater extent, under the direct control of the teacher, many teaching decisions are affected or modified by the classroom context. For example, a teacher's decisions may be influenced by the skill range of the students or by the availability of materials within the classroom. Or, in any given school year, a teacher's knowledge and competency in dealing with a "hard to teach" student may positively or negatively influence the achievement level of that student. Educators must focus on the interaction of <u>all</u> factors, not merely the student, to understand a student's achievement level. Simply stated, educators must focus on <u>learning</u>, not just the <u>learner</u>. The effect of environmental variability on student achievement is well documented (Howell, 1986).

The complexity of the environment is cited by Calfee (1981, p. 36):

> We watch an ant make his laborious way across a wind- and wave-molded beach. He moves ahead, angles to the right to ease his climb up a steep dunelet, detours around a pebble, stops for a moment to exchange information with a compatriot. Thus, he makes his weaving, halting way back to his home....I sketched the path on a piece of paper. It is a sequence of irregular, angular segments -- not quite a random walk, for it has an underlying sense of direction, of aiming toward a goal.
>
> I showed the unlabeled sketch to a friend. Who's path is it? An expert skier, perhaps, slaloming down a steep and somewhat rocky slope, or a sloop, beating upwind in a channel dotted with islands or shoals. Perhaps it is a path in a more abstract space: the course of search of a student seeking the proof in a theorem in geometry.

> Whoever made the path, and in whatever space, why is it not straight; why does it not aim directly from its starting point to its goal?...
>
> Viewed as a geometric figure, the ant's path is irregular, complex, hard to describe. But its complexity is really a complexity in the surface of the beach, not a complexity in the ant...
>
> An ant [and likewise a man], viewed as a behaving system, is quite simple. The apparent complexity of his behavior over time, is largely a reflection of the complexity of the environment in which he finds himself. (Simon, 1981, pp. 63-65)

Instruction is a dynamic process; it is an ongoing cycle of constantly adjusting for error while providing some degree of challenge (Gickling, 1981). Our reviews suggest to us that there are 10 factors that are essential for instructional quality, and that have a critical impact on student achievement. Instructional factors that are important for student achievement include (a) those that set the stage for learning and are primarily part of the teacher's plan for teaching (management procedures, classroom climate), (b) those that are most evident during teacher-student contact (instructional match, teaching goals, instructional clarity, instructional support, opportunity to learn, opportunity to respond, and active monitoring), and (c) one that involves making decisions about subsequent instruction (evaluation).

The reader needs to recognize that these 10 factors are described as important for an <u>individual</u> student's achievement. We recognize that the implementation of these factors, given the range of individual differences, is difficult and complex. Instructional factors that influence student learning include:

- The degree to which classroom management is effective and efficient.
- The degree to which there is a sense of "positiveness" in the school environment.
- The degree to which there is an appropriate instructional match.

- The degree to which teaching goals and teacher expectations of student performance and success are stated clearly and are understood by the student.
- The degree to which lessons are presented clearly and follow specific instructional procedures.
- The degree to which instructional support is provided for the individual student.
- The degree to which sufficient time in allocated for academics and to which instructional time is used efficiently.
- The degree to which the student's opportunity to respond is high.
- The degree to which the teacher actively monitors student progress and understanding.
- The degree to which student performance is evaluated appropriately and frequently.

The goal of this monograph is to summarize the global implications of the professional literature for instruction of handicapped students. Each factor is described and discussed briefly. Relevant references are listed following a description and discussion of each factor. The reader is referred to monographs 2 to 6 for specific references for specific ideas.

Instructional Factors That Set The Stage For Learning

The Degree to Which Classroom Management is Effective and Efficient

Effective and efficient classroom management allows for increased instructional time. Time is a finite commodity; thus, how teachers use time is important for increasing students' learning opportunities as well as their levels of achievement. The teacher's skill in managing classroom activities and student behavior is important, both for increasing the amount of time available for instruction, and for increasing students' engagement rates.

Efficiency is as important as effectiveness; the key to successful classroom management is preventive -- in regard to both behavioral disruptions

and time wasters. The literature supports the approach of having teachers select a few, essential classroom rules and procedures and, then, explicitly communicate their expectations regarding classroom behavior; in younger grades this means rehearsing the rules and routines. The teacher's credibility as an effective manager is most efficiently established within the first two weeks of school.

Effective managers handle behavioral disruptions promptly. They have alternatives for handling inappropriate behavior and they follow through with appropriate consequences. They maintain a well-managed classroom by having an on-going surveillance system; continuous scanning and the use of meaningful, nonverbal signals allow them to monitor the behavior of one group of students while teaching another. Finally, effective managers develop a sense of both responsibility and accountability in their students. Explicit learning goals, clearly stated task expectations, and student involvement in assigned tasks are used by effective managers to set the tone for student accountability.

Classrooms in which fewer behavioral problems occur tend to use established instructional routines, resulting in increased student cooperation and control. Students in these classrooms know when they are confused, know how to obtain necessary information or assistance, know where materials and supplies are kept, and know the procedures for bathroom breaks, sharpening pencils, and selecting the next activity upon completion of an assignment. Transitions are brief in these classrooms.

Teachers' classroom management is affected by the order, discipline, and academic focus established in the school. The principal plays a critical role in creating a safe, orderly, and academically-focused school environment. The

amount of time allocated for instruction and for the development of learning opportunities -- and, in effect, student achievement -- are enhanced or limited by administrative policies regarding classroom interruptions.

In summary, a well organized, efficiently run classroom is enhanced when students' knowledge about specific behavioral expectations and classroom routines is paired with the teacher's ability to monitor and follow through. Establishing an academic focus results in increased instructional time and higher student accountability. Effective classroom management is a necessary, but not sufficient, condition for student learning. Teachers' management procedures set the stage for critical teaching variables such as effective demonstration and modeling procedures, lesson pacing and the ability to maintain the student's attention, and academic engaged time.

Anderson (1984b)
Bickel & Bickel (1986)
Brophy (1983a)
Clark, Lotto, & McCarthy (1980)
Doyle (1986)
Edmonds (1981)
Emmer, Evertson, & Anderson (1980)
Englert (1984a)
Evertson & Emmer (1982)
Evertson, Emmer, Sanford, & Clements (1983)
Good (1983)
Good & Brophy (1984)
Karweit (1983, 1985)
Kerman (1982)
Kounin (1970)
Levine & Stark (1982)
McCormack-Larken (1985)
Miller, Cohen, & Sayre (1985)
Samuels (1986)
Wang (1984)
Wyne & Stuck (1982)

The Degree to Which There is a Sense of "Positiveness" in The School Environment

As repeatedly demonstrated in the literature on school and teacher effectiveness, the creation of a positive climate -- in both the classroom and the school -- is an important correlate of student learning. Student achievement is higher when the classroom climate is characterized by an academic focus with a humanistic orientation. Cooperative learning structures are superior to competitive learning structures for promoting academic gains.

Clearly, an orderly school environment, fostered by strong administrative leadership, parent-teacher contact and collaboration, and effective classroom management procedures, adds to the academic focus essential for student learning.

The extent to which teachers believe that students can learn, that teachers can make a difference, and that the school as a whole can teach all students, has a positive impact on student learning. Teachers (and schools) with these beliefs set high, realistic expectations for student performance, consider student characteristics and needs when planning instruction, reinforce student productivity through effective praise and active monitoring, emphasize basic skill acquisition and student progress, and expect success for all students (even low achievers). These school characteristics provide the conditions for teachers to instruct more effectively; the conditions create an atmosphere or positive ethos for learning.

Blair (1984)
Brandl (1983)
Brophy (1979)
Brophy & Good (1986)
Carroll (1963)
Clauset & Gaynor (1982)
Edmonds (1981)
Fraser (1981)
Gibson & Dembo (1984)
Good & Brophy (1986)
Guzzetti & Marzano (1984)
Harnischfeger & Wiley (1985)
Hawley & Rosenholtz (1984)
Hersh, Carnine, Gall, Stockard, Carmack, & Gannon (1981)
Johnson & Johnson (1986)
Johnson, Maruyama, Johnson, Nelson & Skon (1981)
Levine & Stark (1982)
Medley (1980)
Moos (1980)
Rosenshine & Berliner (1978)
Rutter, Maughan, Moritmore, Ouston, & Smith (1979)
Slavin (1980)
Squires (1980)
Squires, Huitt, & Segars (1983)

Instructional Factors Evident During Student-Teacher Contact

The Degree to Which There is an Appropriate Instructional Match

Achieving an appropriate instructional match is mentioned consistently as a primary contributing factor in student achievement. Instructional match, the

result of two teaching functions (diagnosis and prescription), refers to the degree of congruence between the student's skill or functioning level and the nature of the assigned tasks. Several student task characteristics are thought to influence the quality of the instructional match. Student characteristics include the student's level of prior knowledge, level of current skills (e.g., automaticity of skills), strategy use, processing skills, interests, and motivation, or persistence, for learning. Task characteristics thought to influence the effectiveness of the instructional match include the difficulty level of the materials, the level of cognitive processing required on the task, and the relationship between the type of task and the instructional stage (introduction, maintenance, review).

After an assessment (i.e., diagnostic teaching function) of both task and student characteristics, effective instruction involves matching the learning task to the student's aptitude, adapting the instruction to meet the student's needs, and analyzing the learning conditions in the classroom (e.g., lesson presentation, monitoring, feedback, pacing) to determine whether the time devoted to learning is sufficient to ensure student progress (i.e., prescriptive function). In a sense, the diagnostic teaching function identifies "what to teach" and the prescriptive teaching function specifies "how to teach" the student.

The extent to which classroom learning tasks are selected and designed to meet a student's instructional needs is routinely described as an indication of the quality of instruction. Task appropriateness is important both for tasks closely supervised by the teacher (perhaps during lesson introduction or guided practice) and for seatwork assignments. Since students spend an average of 70%

of the school day in independent seatwork activities, the appropriate match between task and student ability is critical for achieving high rates of task engagement and productivity.

Two aspects of task appropriateness are the degree to which: (a) the student is able to complete the task with a high success rate, and (b) the task is academically relevant (i.e., extends the student's understanding of the subject matter and does not merely fill time). Task appropriateness is an important correlate of academic achievement. Academic learning time, a measure of task appropriateness, is the amount of time students are actively engaged in completing academically-relevant tasks with a high rate of success. Academic learning time is an indication of student participation and student understanding; each is influenced by the degree to which procedural details about the concept being studied are sufficient, and clearly presented. A student's understanding of task requirements, self-report about attention during instruction, and use of specific cognitive strategies are strong correlates of academic performance.

Anderson (1984b)
Anderson & Scott (1978)
Bennett, Desforges, Cockburn, & Wilkinson (1984)
Bloom (1974, 1976, 1980)
Brophy & Good (1986)
Calfee (1981)
Carroll (1963)
Case (1978)
Doyle (1979)
Dunn & Dunn (1979)
Fisher, Berliner, Filby, Marliave, Cahen, & Dishaw (1980)
Gagne & Briggs (1979)
Gersten, Woodward, Darch (1986)
Gettinger (1984)
Good (1983)
Haring & Eaton (1978)
Hudson, Colson, & Braxdale (1984)
Hunt (1961)
Letteri (1980)
Levine & Stark (1982)
Marliave & Filby (1985)
Peterson, Swing, Stark, & Waas (1984)
Rosenshine & Stevens (1986)
Sitko and Slemon (1983)
Wang & Lindvall (1984)

The Degree to Which Teaching Goals and Teacher Expectations for Student Performance and Success are Stated Clearly and are Understood by The Student

Goals, objectives, expectations, acceptable performance standards, desired outcomes, and criteria for mastery are used interchangeably to refer to teaching goals. Teaching goals/objectives are considered to be the master plan for what occurs in the classroom. While the literature supports the importance of clearly stated goals for student learning, it also indicates that teachers may know the goal but often do not articulate it for the unit or lesson. Other research indicates that students do not always understand the lesson goal intended by the teacher. Some of the discrepancy between teacher intentions and student understanding may be due to incomplete communication; some may be due to lack of specificity in communicating the lesson objective. The literature strongly supports the approach of communicating teaching goals frequently and explicitly (i.e., "Today we are going to learn to carry numbers when adding.... This is important because...."); rather than more globally (i.e., "Today we are going to improve our math or our adding"). Goals are communicated clearly when they indicate not only what the student will do (which really is an aspect of task directions), but also what the student will learn.

Effective goal setting is influenced by both the school environment and the teacher's skill in using diagnostic information to achieve an appropriate instructional match. Schools assist teachers in their goal setting by having high expectations for the success of all students and by creating an academic emphasis in the school. A safe and orderly environment and staff collaboration to establish adequate programs for all students are two critical characteristics of a school with a strong academic focus. When teachers establish teaching goals and objectives for an individual student, they must consider student and

task characteristics, as well as material selection, in relation to their expectations for the quantity, quality, and neatness of assigned work. Schools set the tone for high expectations and teachers refine those expectations, making them realistic for individual students.

In order to adequately evaluate student performance, it is, first, necessary to establish goals and mastery criteria. The establishment of predetermined mastery criteria is also important for keeping students informed of their progress and for increasing student motivation and accountability. A teacher's clear communication regarding both instructional goals and academic standards is necessary to provide students with relevant, task-specific feedback and appropriate corrective procedures.

Stated teacher expectations are critical for student learning; however, teachers' treatment and interactions with students are equally important. Evidence exists that teachers interact differently with low and high achievers and that students interpret this differential treatment in varied ways, resulting in a lower academic self concept for some students. Equal opportunity to respond -- through application of specific error-correction procedures that provide students with cues that facilitate more accurate responses -- has improved the self concept and progress of low achievers.

Anderson (1984b)
Blair (1984)
Bloom (1980)
Brophy (1986)
Brophy & Good (1970, 1986)
Clark, Lotto, & McCarthy (1980)
Cooper & Good (1983)
Dembo (1981)
Doyle (1983)
Dweck (1975)
Frymier (1981)
Fuchs, Deno, & Mirkin (1984)
Fuchs, Fuchs, & Deno (1985)
Gagne & Briggs (1979)
Good & Brophy (1986)
Guzzetti & Marzano (1984)
Hartley & Davies (1976)
Kerman (1982)
Marx (1983)
Rosenshine (1986)
Sindelar, Smith, Harriman, Hale, & Wilson (1986)
Squires, Huitt, & Segars (1983)
Weinstein (1983)
Weinstein & Middlestadt (1979)
Wong, Wong, & LaMare (1982)

The Degree to Which Lessons are Presented Clearly and Follow Specific Instructional Procedures

Quality of instruction, as discussed in the literature, refers to the degree to which lessons are explained, clearly, through demonstration, modeling and examples, and whether the concepts and skills presented are understood by the student. The language of instruction used by teachers is critical; new vocabulary must be logically and thoroughly explained and important task features must be made salient for the student. The adequacy of the instructional presentation for student learning is influenced by (a) the extent to which the lesson is congruent with the teaching goal and the practice activity, and (b) the degree to which the teacher actively teaches and communicates with students about classroom learning tasks. In general, the higher the teacher-student interactive nature of a classroom , the higher the engagement rate in that classroom. If the student is assigned an academically relevant task at an appropriate level of difficulty (instructional match) and interactive teaching occurs, the quality of instruction can be considered high.

The literature supports four essentials for achieving instructional clarity in the classroom. First, teachers' use of specific instructional procedures in developing the lesson has been found to be an important academic correlate, particularly for low achieving students. A demonstration-prompt-practice sequence is characterized by teacher-directed instruction, well organized instruction provided in small steps, a high frequency of student questioning, and the monitoring of students during independent seatwork. The defining characteristic of this instructional sequence is active -- active participation and involvement in learning by students, and active teaching and monitoring by

teachers. Lessons begin with a review of previous work or prerequisite concepts and an overview of what is to be learned. Demonstration procedures are of an appropriate length for the student and, because of the careful lesson explanation, reduce the incidence of student errors. Effective guided-practice opportunities are characterized by a high frequency of student response, by having the teacher check for student understanding, by the use of specific error correction procedures, and by review, repetition, and rephrasing of the lesson until the student understands it. When a student responds correctly, with high frequency, independent practice is begun and is provided until the student reaches a specified learning outcome. Corrective teaching procedures are used for students who have failed to achieve a standard. Practice is a critical stage for achieving positive student outcomes. There needs to be a sufficient amount of practices and and practice must include drillwork to increase fluency and automaticity of skills as well as exposure to various activities to increase generalization and application of skills.

Across the literature areas reviewed, there is evidence that student achievement increases when students are provided with enough time to learn and to master the skill being taught. The amount of time spent at the three stages in the instructional sequence needs to be varied according to student characteristics. Low achieving students need to spend less time in demonstration and more time in guided practice opportunities, while high achieving students need less time in demonstration and guided practice and more time in independent practice. How much time is needed (for different kinds of students to learn different types of material under different conditions), how to measure the amount of time that is needed, and how to provide varying amounts of needed time when teaching 25 students is a challenging task.

Second, the degree to which instruction is explicit is important for promoting positive academic outcomes for students. Explicitness refers to whether the instruction is meaningful or understandable to the student. The literature supports a well organized, step-by-step instructional presentation that articulates what skill is to be learned, why the skill is important, when the skill is useful, and how to apply the skill. Student understanding of the lesson -- particularly "why" and "what" they understand -- is considered to be a good indication of lesson explicitness.

Third, a student's understanding of task demands and directions is important for instructional clarity. A lesson is thought to be clearly presented if students understand not only what they have to do but how to do it. The literature strongly supports the belief that it is not sufficient for teachers to assume that their lesson presentation was explicit or and that clear task directions were given. Teachers need to actively check student understanding of task directions and demands, particularly for procedural details in independent seatwork assignments. Students benefit by explaining to the teacher, themselves, "how" to perform a task. Often a student's response provides the teacher with an opportunity to correct faulty thinking and to teach cognitive strategies designed to increase learning efficiency.

Fourth, a systematic application of learning principles characterizes those lessons with a high degree of instructional clarity. Student performance is improved when student attention is gained and maintained, when positive reinforcement is used, when motivation for learning is high, and when varied practice activities are used to help increase generalization skills. Ideally, learning principles are used throughout the instructional sequence and are modified, by the teacher, according on the student's response.

Anderson, Evertson, & Brophy (1979)
Barber (1979)
Becker, Englemann, Carnine, & Rhine (1981)
Brophy & Good (1986)
Bugelski (1971)
Carroll (1981)
Durkin (1985)
Englemann (1980)
Englert (1984b)
Fisher, Berliner, Filby, Marliave, & Cahen & Dishaw (1980)
Frederick & Walberg (1980)
Gagne & Briggs (1979)
Gettinger (1984)
Good (1983)
Good & Grouws (1979)
Haring & Eaton (1978)
Huitt & Caldwell (1984)
Huitt & Segars (1980)
Hunter (1979)
Reid (1981, 1986)
Rosenshine (1986)
Rosenshine & Stevens (1986)
Sindelar, Smith, Harriman, Hale & Wilson (1986)
Wang, Gennari & Waxman (1985)

The Degree to Which Instructional Support is Provided for The Individual Student

Students require feedback and reteaching as new learning material is introduced by the teacher. Ongoing assistance or instructional support for mastery of skills/concepts occurs in classrooms in many ways and is influenced by both the teacher's diagnostic ability to correctly assess students' needs and the teacher's instructional management skills. As teachers instruct students, modifications need to be made to meet the needs of individual students. Students achieve more in school when they are taught by teachers who engage in a monitor-adjust process during instruction. The teacher's ability to adjust or adapt instruction so that a high success rate is maintained is especially important on independent seatwork assignments. Systematic procedures for adaptive instruction have yielded increases in student achievement, especially for mildly handicapped students in mainstream classrooms. Effective adaptive instruction programs are characterized by diagnosis, prescription, monitoring and diagnosing, interactive teaching, record keeping, and by the creation and maintenance of instructional materials. These characteristics are essential for the effective teaching of individuals within groups.

Effective instructional management and a staff flexible enough to accommodate student needs are prerequisites for providing necessary instructional support for individual students. The systematic use of adaptive instructional procedures, such as the Adaptive Learning Environments Model, (ALEM), is contingent upon effective instructional management, both within a single classroom, and from one classroom to another. Similarly, instructional modifications are most effective when teachers are efficient managers and use flexible grouping procedures and other resources, such as cooperative learning structures and peer tutoring.

Instructional support is provided for students when the teacher definitively models thinking skills or "how to" procedures during the instructional lesson. Students taught by teachers who make "visible their invisible thinking" show greater gains in reading comprehension. The direct teaching, to students, of learning strategies is proving to be a promising way to increase student achievement and responsibility for learning. Incorporating a cognitive emphasis into both the instructional plan and the lesson design is a major focus of the literature that deals with teaching and student cognition.

Finally, providing time needed to learn is a primary, critical theme, thought to influence an individual student's achievement. The amount and kind of practice provided to an individual student has a positive or negative influence on that student's rate of progress and on whether mastery of the skill/concept is attained. In general, more guided practice is needed for low achieving students and less guided practice is needed for high achieving students. More drill work and practice is needed for low achieving students to reach automaticity. Many individuals argue that students are moved through the

curriculum without the practice needed to maintain skills and provide a basis for generalization; hence, they are not provided sufficient time for learning. Since students' rates of learning vary, adaptive instruction is necessary to instruct individuals taught in groups. The challenge lies in creating instructional interventions that enable a teacher to provide appropriate tasks and sufficient learning time.

Anderson-Inman (1986)
Anderson, Evertson & Brophy (1979)
Anderson, Evertson, & Emmer (1980)
Blair (1984)
Bloom (1985)
Brophy (1983b, 1986)
Corno & Mandinach (1983)
Denham & Lieberman (1980)
Deshler & Schumaker (1986)
Doyle (1986)
Duffy, Roehler, Meloth, Vavrus, Book, Putnam, & Wesselman (1986)
Gettinger (1984)
Good (1983)
Guzzetti & Marzano (1984)
Harnischfeger & Wiley (1985)
Hawley & Rosenholtz (1984)
Kavale & Forness (1986)
Levine & Stark (1982)
Marliave & Filby (1985)
Marx (1983)
Peterson & Swing (1982)
Peterson, Swing, Braverman, & Buss (1982)
Peterson, Swing, Stark, & Waas (1984)
Rohrkemper & Bershon (1984)
Samuels (1982)
Slavin (1980)
Stainback & Stainback (1984)
Tobias (1982)
Wang (1984)
Wang, Gennari, & Waxman (1985)
Waxman, Wang, Anderson, & Walberg (1985)
Weinstein (1983)
Winne & Marx (1982)
Wittrock (1986)

The Degree to Which There is Sufficient Time Allocated to Academics and Instructional Time is Used Efficiently

Time is an important resource in school. Although it is a fixed, finite resource, it is considered to be a variable over which educators have some control and influence. It is considered to be alterable. Time research has identified many types of time, including scheduled, allocated, engaged, and academic responding time. These terms are not defined consistently in the literature. As we refer to time, scheduled time means the time the teacher plans to spend in various activities, allocated time is the amount of time

actually devoted to various activities and tasks by the teacher, academic engaged time is the time spent by each student making different kinds of academic responses, and active academic responding time is the time spent by a student making active, observable learning responses (does not include passive responding such as attending or listening). Allocated, academic engaged, and active academic responding times differ from scheduled time in that they are what actually occurs in classrooms and are measurable by direct observation.

Researchers have demonstrated that school and teacher differences exist in the time allocated to instruction. When the time allocated to different instructional activities is aggregated over the school year, large differences among schools and among classrooms result. The amount of time allocated to a subject area influences the amount of material or the skill sequence that is covered for that subject; content coverage is a positive academic correlate.

Academic engaged time is an important time variable because it is a stronger correlate of achievement than allocated time. Engaged-time research findings indicate that students spend a relatively small percentage of the school day engaged in academics. Further, the percentage of time engaged varies considerably both across classrooms and between the individuals within those classrooms. Academic engaged time or time on task refers to the actual time students are engaged on activities/tasks intended to produce a specific learning outcome. Students must be engaged with a high rate of success, on academically relevant tasks, (referred to by some individuals as academic learning time), to produce the greatest academic gain. Research findings suggest that handicapped learners spend more time engaged in tasks that have a lower success rate. In addition, engaged time rates depend on a variety of organizational factors

(classroom management, class size, interruptions), on specific content area, and on the point in time during the instructional period.

Active academic responding time is a stronger correlate of achievement than engaged time; engaged time includes attending, which is considered a passive response with less of an impact on student achievement. Many individuals argue that students must be actively engaged in relevant academic practice in order to learn. The amount of time allocated to instruction, to engaged time, and to active academic responding time are, all, varying aspects of a student's opportunity to learn. Large differences exist, among students, in how these varying aspects of time affect the learning process. Many individuals believe that these differences contribute to variations in achievement.

In addition to a tremendous variation in the use of classroom time, there are data to suggest that additional time used to make up for ineffective instruction correlates negatively with achievement. Time is a necessary, but not sufficient, condition for improving student achievement. The qualitative nature of instructional time is essential; without effective instruction, large increases in instructional time may be required to produce relatively small changes in achievement.

The relationship between the time spent in learning and the time needed for learning is another way of examining "time" in the classroom. The degree of learning accomplished by an individual student is expressed by the ratio of time-spent to time-needed to learn. The literature supports the influence of multiple factors on time spent on learning and time needed to learn. These factors, which exist at all levels of the educational system, include: district, school, classroom, teacher, and individual student characteristics.

While most individuals consider time to be an alterable variable, others suggest that it is not, because of complex teacher, student, and classroom variations in engaged time. Some individuals argue that achievement may be improved in two ways: (a) by increasing the student's time spent in learning, and (b) by decreasing the student's time needed to learn. Key instructional elements, identified in the professional literature, for improving achievement by increasing a student's time spent in learning or decreasing a student's time needed to learn include: appropriate learning tasks, clearly stated expectations for student success, efficient classroom management, frequent and specific feedback, high degree of teacher-student interaction, task specific reinforcement, and active monitoring to meet instructional goals.

Anderson (1984a, 1984b)
Bickel & Bickel (1986)
Bloom (1974, 1980)
Borg (1979)
Carroll (1963)
Confrey (1981)
Cooley & Leinhardt (1980)
Denham & Lieberman (1980)
Englert (1984a)
Fisher & Berliner (1985)
Frederick & Walberg (1980)
Gettinger (1984)
Graden, Thurlow, & Ysseldyke (1982)
Greenwood, Delquadri, & Hall (1984)
Harnischfeger & Wiley (1985)
Haynes & Jenkins (1986)
Karweit (1983)
McNamara (1981)
Rosenshine & Berliner (1978)
Ross (1984)
Squires, Huitt, & Segars (1983)
Wang (1984)
Zigmond, Vallecorsa & Leinhardt (1980)

The Degree to Which The Student's Opportunity to Respond is High

Opportunity to respond is correlated positively with academic achievement. Students who engage in more active academic responses (e.g., writing, reading aloud) make greater gains in achievement than do students whose responses are more passive (e.g., attending). Students who are given more opportunity to respond tend to cover more academic material, and have a better understanding of tasks; both of these factors result in greater progress through the curriculum.

A student's active academic responding time is influenced by the degree of substantive interaction that occurs between teacher and student and by the teacher's use of specific error-correction procedures. Effective teaching and feedback increase a student's opportunity to respond by providing cues and prompts that lead the student to the correct answer, and by carefully sequencing the instruction to maintain high rates of student accuracy. In addition, when teachers provide cues and corrective procedures for inaccurate student responses, they not only teach students the skill/concept but they set a "tone" that conveys the message that all students are expected to respond and be active learners. Achievement is improved when all students have an equal opportunity to respond. A teacher makes many instructional decisions related to management, organization, and presentation style that affect a student's opportunity to learn. Effective teachers select tasks carefully to maintain an "activity flow" geared to keep students involved in learning.

Much of the school day is devoted to independent seatwork activities. Alternative teaching strategies such as choral responding, peer tutoring, and cooperative learning structures, are advocated as ways to increase the number of opportunities a student has to respond. In general, these teaching methods are more interactive than typical seatwork activities.

In summary, schools that allocate more time to academic instruction, and that minimize the occurence of interruptions during classroom instruction, indirectly increase the students' opportunities to respond. Teachers have a direct influence on the opportunity to respond. Specifically, teachers who interact more with students, who use error correction procedures, and who call on all students during instruction offer students a greater opportunity to respond.

Anderson (1984a, 1984b)
Anderson, Evertson, & Brophy (1979)
Bickel & Bickel (1986)
Bloom (1980)
Borg (1979)
Brophy (1986)
Delquadri, Greenwood, Whorton, Carta, & Hall (1986)
Denham & Lieberman (1980)
Doyle (1986)
Englert (1984a, 1984b)
Fisher & Berliner (1985)
Gersten (1985)
Good (1983)
Good & Brophy (1984)
Greenwood, Delquadri & Hall (1984)
Harnischfeger & Wiley (1985)
Haynes & Jenkins (1986)
Huitt & Caldwell (1984)
Karweit (1985)
Kerman (1982)
Kounin (1970)
Leinhardt, Zigmond & Cooley (1981)
Levine & Stark (1982)
McCormack-Larkin (1985)
Reid (1981, 1986)
Samuels (1982)
Wyne & Stuck (1982)

The Degree to Which The Teacher Actively Monitors Student Progress and Understanding

Active teacher monitoring of student performance is viewed in all research areas as essential for maintaining student participation and encouraging learning. In a sense, it is what keeps the total instructional cycle effective. Frequent monitoring of student progress (usually by standardized test results) is one way schools establish an academic focus and assist teachers. Teachers monitor student progress in various ways; the key for student learning, appears to be the degree to which monitoring is active and frequent.

Teachers plan instruction for groups; monitoring is the vehicle to adapt instruction to meet individual differences. Monitoring is essential if a match between instruction and student need is to be maintained. It is especially important for teachers to monitor students' understanding of task requirements and the processes needed to successfully complete assigned tasks. A student's responses and comprehension must be checked soon after independent assignments are given. Monitoring must be active and interactive, and include asking the student to demonstrate how to complete the task. It is not enough to assume that individual students understand "how" to complete a task even if the lesson

explanation is explicit and clear task directions are provided. Early and frequent monitoring of student comprehension enables the teacher to catch an error before extensive practice occurs; higher success rates can be maintained consistently with active monitoring. Informed feedback, use of correction procedures, and changes in lesson pace are by-products of active monitoring. Monitoring of student performance is most effective when it is ongoing and frequent.

Monitoring student attention, defined as "time on task", is also important. Many individuals suggest that low rates of academic engaged time be viewed as an instructional mismatch rather than as an inherent student characteristic, such as lack of motivation. Individuals caution that teachers need to actively monitor a student's progress toward instructional goals, not just task involvement.

Monitoring is viewed as a critical teacher function, but one that is increasingly difficult to implement in large classrooms, especially when the range of functional skill levels requires the formation of several instructional groups. Effective teachers maintain a productive activity flow in the classroom by continuous scanning and monitoring. Assistance for classroom teachers often includes the use of peers and volunteer aides as well as group demonstration checking procedures.

Anderson (1984a)
Anderson, Evertson, & Brophy (1979)
Bennett, Desforges, Cockhorn, & Wilkinson (1984)
Bloom (1985)
Brophy (1983a, 1986)
Brophy & Good (1986)
Carroll (1985)
Clark, Lotto, & McCarthy (1980)
Delquadri, Greenwood, Whorton, Carta, & Hall (1986)
Denham & Lieberman (1980)
Englert (1984a, 1984b)
Fuchs, Deno, & Mirkin (1984)
Good (1983)
Good & Brophy (1986)
Good & Grouws (1979)
Goodman (1985)
Harnischfeger & Wiley (1985)
Hawley & Rosenholtz (1984)
Johnson & Johnson (1986)
Karweit (1985)
Kounin (1970)
Marliave & Filby (1985)
Reid (1986)
Rosenshine & Stevens (1986)
Sindelar, Smith, Harriman, Hale, & Wilson (1986)
Squires, Huitt, & Segars (1983)
Stallings & Kaskowitz (1974)
Wang, Gennari, & Waxman (1985)

An Instructional Factor That Influences Subsequent Instruction

The Degree to Which Student Performance is Evaluated Appropriately and Frequently

An evaluation of student learning is essential in order to determine whether instructional goals have been met. Thus, evaluation occurs often, or at the end of instruction, and serves to recycle the instructional process back to the beginning -- the next instructional goal.

While evaluation is considered to be an essential teaching function, there are, minimally, two characteristics that are deemed critical for an effective evaluation of student performance and progress. First evaluation must be frequent and, second, it must be congruent with, or overlap with, what is being taught (referred to as "curriculum alignment"). With these characteristics, evaluation serves to provide the teacher with information about student progress. This is essential for effective decision making about subsequent instruction: Effective evaluation yields information which is useful in making subsequent instructional decisions. The degree to which student performance data are used to make subsequent instructional decisions and to monitor the

progress of individual students toward specific goals is correlated positively with achievement.

Proponents of various models of school learning argue that teaching to mastery increases student achievement. While teachers believe in the principles of mastery learning, they find it difficult because of individual learning rates to provide all students with the learning time they need. Teachers' beliefs and their ability to individualize instruction through adaptive teaching procedures influence student mastery of goals. Too often teachers teach groups of students rather than individuals within groups; the former too often results in many students making rapid progress through the curriculum without achieving mastery or maintenance of skills. Effective decision making about the next instructional step in a sequence should be data based and consider instructional stages (introduction, practice, review).

Instructional decision making is influenced also by the attitudes or beliefs which characterize an individual school and by the type of curriculum used. Some individuals advocate exposing students to a breadth of skills, with less intensive practice; but most advocate that students, particularly low achievers, need sufficient learning time in which to consolidate their knowledge. Spiraling curricula provide repeated exposure to the same skills at several grade levels. Often teachers move a student through the curriculum without the student learning a particular skill, because of an assumption that the student will have an opportunity to learn the skill next year. Accountability for student learning is often missing in these situations. Clearly, whether instructional decisions for students are data based is an important consideration in measuring student progress.

Bloom (1974, 1985)
Carroll (1963, 1985)
Clark & Peterson (1986)
Cooley & Leinhardt (1975, 1980)
Dembo (1981)
Deno (1986)
English (1980)
Fuchs, Deno, & Mirkin (1984)
Fuchs, Fuchs, & Warren (1982)
Gagne & Briggs (1979)
Gettinger (1984)
Good & Brophy (1986)
Hartley & Davies (1976)
Hawley & Rosenholtz (1984)
Huitt & Segars (1980)
Karweit (1983)
Roberts & Smith (1982)
Rosenshine (1986)
Shavelson (1983)
Shavelson & Borko (1979)
Squires (1980)

Summary

If there is a hallmark of an effective learning environment for an individual student, it is the degree to which the environment is constructively active. In an effective learning environment, the teacher engages in active teaching, and monitors each student's performance toward a predetermined goal. The student is actively engaged in completing relevant academic tasks successfully; tasks refer to a set of goal-directed activities with a specified, or intended, learning outcome (Posner, 1982). The classroom atmosphere is academically focused with a humanistic orientation. Informed feedback and adaptive instruction provide important instructional support to help meet the student's needs. Evaluation is based on how student performance-data relates to the initial teaching goal. The learning environment is dynamic, and changes to meet the needs of individual students.

Understanding the learning environment relative to an individual student and how instructional variables affect student achievement is a complex task. Time is considered to be a mediating variable between teaching and learning. There are various labels for time (e.g., allocated, engaged, responding); the label used has implications for understanding the kind of instruction an individual student receives. While there is general agreement that time is a

finite resource and that what counts is whether it is used efficiently and productively (e.g., Karweit, 1985), this integration of several literature areas highlights how the relationship between time and learning is complicated by the fact that classrooms are embedded in a larger context (e.g., Dreben, 1984). Many times educational decisions are made without consideration for, or input from, the immediate actors (i.e., teacher and students).

Three methodological issues are important to consider when analyzing the instructional environment for a student. First, a theoretical or conceptual framework is necessary to understand the teaching-learning process. Empirical evidence, such as a laundry list of teaching variables correlated positively with student achievement, is insufficient. Without an adequate conceptual framework, misinterpretation of existing evidence is possible. A comprehensive discussion of issues related to a conceptual framework for the context of teaching is provided by Burns (1985). Based on our review, we believe that the instructional environment involves the interaction of student characteristics (e.g., aptitude, motivation), task characteristics (e.g., difficulty level, cognitive processing demands), and the management and instructional strategies directed by the teacher (Rosenfield, in press). The literature strongly supports systematic classroom observation, understanding the student's perception of assigned tasks, and understanding the teacher's rationale for instructional and management decisions. A theme throughout the professional literature is the recognition of the complexity of the classroom and the inherent inter-connectedness of task characteristics and teacher and student behaviors/decisions. The teaching-learning process is no longer seen as something "done" to students but rather as something that students participate

in; students' responses not only affect the degree of learning but also influence the teacher's decision about instruction. In summary, the behavior of both the teacher and the student only has meaning when the entire context of the classroom is considered.

A second methodological issue is what to measure. Although many variables have been identified as academic correlates, many of these variables are not mutually exclusive in their influence on student achievement. Due to the contextual nature of behavior, observation in naturalistic settings -- including coding of contextual variables and teacher-student interactions -- is recommended (Medley, 1979). Observation can be conducted in an ecological fashion focusing on careful observations, recording natural behavior and analyzing the descriptions for patterns of behavior in specific settings and under particular circumstances, or by using systematic observation systems. We believe that an observation system that includes the 10 factors discussed in this monograph meets Anderson's (1985) requirements for appropriateness and feasibility.

The third methodological issue is who to measure. The purpose for which the information is being gathered dictates "who to measure". For example, if the purpose is to examine "what teachers do in classrooms", the teacher should be the focus of the measurement; an approach that is appropriate in teacher-evaluation scales. If the purpose is to understand "how students spend their time", the student should be the focus of the measurement. If the purpose is to understand the instructional environment, the focus cannot be on just one person. Rather, we would argue that the focus needs to be on the interaction of student, teacher, and task relative to the 10 instructional factors. If the

purpose is to describe the instructional environment for an individual student, the unit of data analysis is the student's rating on the factors. Multiple methodologies are needed to understand the complexity of the instructional environment for a student. Classroom observation data, teacher interview data, and student interview data are all necessary and must be integrated to capture the meaning of each of the instructional factors in context.

Placing teacher and student behavior in context and capturing enough of the relevant information to make sense of the situation specificity and reactivity of interactive teacher behavior is what makes it complex and difficult to analyze the instructional environment of an individual student. Anderson and Ryan (1985) caution that it is "the appropriateness of teacher behavior, not its frequency, which delineates the effectiveness of a teacher's actions" (p. 110). Researchers in teacher decision-making argue that a teacher's reasons for making instructional changes and for selecting specific teaching strategies is information that is essential for evaluating the appropriateness of teacher behavior (Clark & Peterson, 1986). The stability of teacher behavior in directing instructional and management strategies is also of concern. Individuals seem to agree that teacher behavior is more consistent within settings; however, considerable within-setting instability is realistic if the teacher is being truly responsive to individual differences. Anderson and Ryan (1985) argue: "We simply do not have the conceptual or methodological skills for contextualizing teacher behavior well" (p. 110). We would argue that we simply do not have the conceptual or methodological skills for contextualizing teacher, student, and task characteristics well. However, it is absolutely necessary to use observation, teacher interview, and student interview to

analyze instructional environments for a student. The degree to which a student understands a task and the rationale for a teacher's decisions regarding an individual student are essential for understanding why and how to intervene for an individual student.

In closing, we argue that understanding the instructional environment for an individual student is not a question of identifying a few critical factors but, rather, is one of identifying the many contributing factors within the environment. This is a complex task. According to Sitko and Slemon (1983):

> Given the variability of student and teacher abilities, the quality of media and materials available, the varying school and home environments, and other factors that change in classrooms from day to day and even minute to minute, it is not possible to determine a best possible course of action ahead of time and rigidly follow it through. In real classrooms effective teachers must plan well but also must be flexible decision makers who can modify their plans according to the demands of the total situation. (p. 2)

Similarly, in his review of classroom research during the past decade, Good (1983) indicates that simple models for attempting to understand instructional environments do not work because classroom problems are varied and complex. After reviewing the topics of time utilization, classroom management, teacher expectations, and teacher-effectiveness research, Good provided an important caution about translating findings from these areas into practice because of the fact that research has primarily examined only single school-variables, such as teachers, or curriculum, or students. He states, "Blind application of research findings needs to be discouraged, not only because the nature of any problem varies from class to class, but also because of our limited knowledge about the classroom processes and conditions that facilitate student achievement" (p. 129). While much has been learned about instructional effectiveness, Good believes we need to know more about the quality and combination of teaching

processes that are associated with increases in student achievement. This monograph has integrated the literature from several areas and identified 10 contributing factors that influence student achievement. These factors, which must be interpreted in context, include teacher behavior and teacher decision making, student perception of the instructional process, and systematic observational methods used in the classroom.

Effective instruction is characterized by an accurate diagnosis of students' instructional needs and the development of a corresponding and appropriate learning plan. Diagnosing students' instructional needs is the easier of the two. We believe students' instructional experiences must include the 10 factors described. In contrast, developing an instructional plan and implementing a learning prescription for the students is more difficult. Implementing an instructional plan for students with special learning needs, or meeting individual learning differences in all learners while teaching 25 individual students may, at times, seem overwhelming for teachers.

What are the implications of this integration of the literature for educators' practices in effectively teaching mildly handicapped students? We suggest that educators consider three key areas when implementing an instructional plan for mildly handicapped students. First, teachers need to focus heavily on the tasks assigned to mildly handicapped students. They should ask themselves:

- Does the assigned work relate to the teaching goal?
- Does the assigned work lead to a specified learning outcome?
- Is the student's success rate high enough to promote academic progress?
- Is the student actively involved in completing appropriate tasks?

If the answers to these questions are yes, we believe teachers have provided an effective instructional match for the individual student and,

consequently, use of instructional time is most likely optimal for the individual student.

Second, teachers need to examine the degree to which they provide active monitoring for mildly handicapped students. They should ask themselves:

- Do I check or have a system for checking (e.g., peer) mildly handicapped students' assigned work?
- Is the assigned work checked several times throughout the lesson?
- Do I ask the mildly handicapped student many questions?
- When giving the student feedback, do I use cues, prompts, and alternative teaching strategies to lead the student to the correct response?
- Do I provide sufficient practice opportunities for the student to reach the specified learning outcome?

We think that teachers who answer "yes" to these questions believe they can make a difference and can teach the mildly handicapped student. They have a high sense of self efficacy and, as a result, examine their own teaching behaviors rather than solely attributing a student's minimal progress to the student's individual characteristics.

Third, all levels of schooling influence student achievement. Thus, educators -- including superintendents, schoolboard members, principals, and teachers -- must examine school policies and decisions. They need to ask themselves:

- Are teachers provided with adequate instructional materials, equipment, and teaching supplies?
- Are school buildings properly maintained?
- Do curricula decisions and policies consider the needs of <u>all</u> students?
- Does staff collaboration facilitate academic programming for all students?
- Does school administration interrupt classroom instructional time infrequently?

If the answers to these questions are yes, we believe that some of the school's factors/policies that are needed in order to maximize the teachers' opportunities to instruct are provided.

We encourage educators to examine their educational practices and beliefs about instructing mildly handicapped students. While implementation of the 10 factors can, for many students, be done in groups, we believe that teaching mildly handicapped students means making instructional modifications for individuals within groups.

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